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Something in the air: Information density, news surprises, and price jumps

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ABSTRACT

This paper introduces a new information density indicator to provide a more comprehensive understanding of price reactions to news and, more specifically, to the sources of jumps in financial markets. Our information density indicator, which measures the abnormal amount of news before scheduled macroeconomic announcements, is significantly related to the likelihood of price jumps and is independent of the magnitude of news surprises or pre-announcement trading activity. We therefore interpret this variable as a measure of additional uncertainty in the market, inducing diffuse beliefs among investors, which are resolved through macroeconomic news as "hard" facts.

1. Introduction

In financial markets, investors are flooded by a variety of information, such as corporate earnings, and macroeconomic and political news. The sheer mass of information makes it almost impossible to assess the importance of all the news for particular assets. Consequently, an abnormally high information flow can lead to imprecise signals. Since investors update their expectations about the economy and asset prices based on various information, it is of particular interest how financial markets process information provided by the news industry, that is, how this information is incorporated into asset prices. This paper contributes to the literature on informational market efficiency by analyzing how the level of information flow prior to public announcements affects the price process in asset markets at the time when "hard" information is released.

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We follow Detemple (1986), who employs a learning framework in the presence of incomplete information, as well as Veronesi (2000) and Li (2005), who provide a theoretical framework on the relationship between information quality and stock market returns. This literature regards external signals as consisting of (price-relevant) fundamentals and (price-irrelevant) noise. Noise impairs the inference about fundamentals as it reduces precision. More precisely, if a signal becomes noisy, different assumptions on the precision of information are made and diffuse beliefs about the true state arise. While noisy information keeps price changes bounded due to dispersion in investors' beliefs (Veronesi, 2000), precise signals immediately trigger a price reaction under the assumption of informationally efficient markets. However, investors have differing access to news flow, and they differ in their ability to read out and price in signals. By learning from actions of other traders following increased news flow, the distribution of price expectations among market participants widens further. This additional uncertainty leads to a deferred price discovery process prior to macroeconomic announcements.

To analyze empirically how new information affects asset returns, we construct a new measure that captures abnormal news flow before a public announcement. We label it information density indicator (IDI). We define abnormal information flow as an increase in the number of ticker items above the prior average information flow. Hence, IDI reflects the excess or abnormal level of information above the preceding news flow during the five-minute interval before the announcement. We then relate information density to (significant) price jumps conditional on scheduled macroeconomic announcements. Consequently, our estimation strategy includes both the information flow prior to a news event and the release of the public announcement itself. While the abnormal increase in information flow leads to imprecise signals, macroeconomic announcements constitute precise external signals. The use of price jumps rather than returns allows us to identify whether bounded price changes prior to the announcement are evident and whether they adjust when "hard" facts are released. In other words, if prior to the release of a public announcement price-relevant signals are not overlaid with noise, this fundamental information would be instantaneously reflected in the price. In contrast, if the dispersion of investors' beliefs increases, they adhere more to prior price expectations which impairs continuous price adjustments to the intrinsic value. When the "hard" information is released, prices consequently adjust to a new equilibrium.

Our empirical results show that a higher abnormal information flow increases the likelihood of price jumps conditional on the release of macroeconomic news. Hence, a price jump is more (less) likely when the preceding flow of information exceeds (falls below) previous levels. Additionally, we find that abnormally high information density without "hard" news cannot be related to price jumps. However, the abnormal amount of specific and/or unspecific, and thus, noisy economic news flow, together with macroeconomic announcements, explains the likelihood of jumps. Our IDI measure is further independent of the magnitude of news surprises and trading activity in the market, and cannot be traced back to holding-up behavior prior to the release of public announcements. Consequently, we interpret this result as limited capacity of market participants to process abnormally high information flow, which lowers the precision of signals. In contrast, if the precision of information is high prior to scheduled news events, information is immediately incorporated in prices. Hence, price jumps at the time of news releases are less likely due to gradual price adjustments before the announcement.

We contribute to the literature on aggregated information flow and the predictability of price jumps. Previous literature mainly focuses on specific information, such as macroeconomic, firm-specific, or political announcements, and thus neglects the impact of information density prior to news events (see, e.g., Almeida et al. (1998), Andersen et al. (2003, 2007) and Hautsch et al. (2011)). Exceptions are Berry and Howe (1994). They develop a measure of public information flow covering the absolute number of news items released by Reuters News Service on a half-hour basis from May 1990 to April 1991. While the authors find a moderate, positive impact on trading volume, the effect on price volatility is insignificant. Clements and Todorova (2016) document a strong impact of positive shocks in news arrivals on realized volatility of gold and oil futures. However, they use the pre-processed volume of information flow, which includes only asset-related news at weekly frequency. The average number of news items in their sample is substantially lower compared to our study. Similar results are found by Kalev et al. (2004), who use firm-specific announcements in their information flow measure to study the impact of variation in information flow on conditional volatility of stock returns.

To the best of our knowledge, we are the first to empirically test how information density prior to macroeconomic announcements affects the asset pricing process. The results are robust to various test designs. We explicitly distinguish between jumps that can be related to a single macroeconomic announcement and jumps that are driven by simultaneous macroeconomic announcements. Previous literature analyzes co-jumps in several assets but fails to address jumps that coincide with more than one macroeconomic announcement. If one distinguishes between multi-announcement jumps with and without conflicting news surprises, previous estimates on sources of price jumps appear to be conservatively underestimated. We base our analysis on bond and stock futures from the U.S. and German market with the FX rate as a linking factor. We use macroeconomic data from the U.S., Germany, and the Eurozone in whole; this expands upon the common data sources used in the jump literature.

The remainder of this paper proceeds as follows: Section 2 addresses the information framework that provides the theoretical foundation for explaining how increasing amounts of information lead to price jumps in asset markets. Section 3 presents the data set, formally introduces our information density indicator, and describes our estimation strategy. In Section 4, we empirically analyze the role of abnormal information flow in predicting the likelihood of price jumps that are conditional on public announcements. We further test our results for robustness against a variety of model and parameter specifications. Section 5 sets forth our conclusions.

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